

**DYNAMIC SMART ALBUM PAGE LAYOUTS IN A DIRECT
CONNECT PRINTER**

FIELD OF THE INVENTION

This invention relates to printers, and in
5 particular to a method and apparatus for arranging
items on a page for printing.

BACKGROUND OF THE INVENTION

Currently, electronic cameras are arranged to be
able to download image files to an external computing
10 device or directly to a printer, for subsequent
reproduction by the printer. When printing such image
files, page layouts of the images on the printed page
are not generated automatically. A user typically
chooses from a set of static layouts that are
15 determined based upon the number of images per page.
For example, if a user specifies one image per page,
then the user is limited to a specific, predetermined
layout of the image file. Such predetermined layouts
do not account for the original size, orientation, or
20 order of the image files, but simply arrange the image
files according to a predetermined template.

Where a page contains images with different
orientations, that is both portrait and landscape
oriented images, viewing of some of the images is
25 awkward. This is disadvantageous when a user would
like to use the printed pages bound together in an
album. These predetermined layouts further cause the
image files to be printed in non-standard sizes, which
do not correspond to typical album sleeves and picture
30 frames. A user is also unable to select the order of
the image files on a page, as the order is determined

by the predetermined layout. As stated above with respect to orientation, a user may desire to display images in a specific order, for example, when showing a particular order of events.

5 Accordingly it is an object of this invention to provide a method and apparatus for printing image files, and to allow a user to specify parameters such that the image files will be printed in a particular order and size, and in a manner such that each image on
10 a page has the same orientation

SUMMARY OF THE INVENTION

A method and apparatus are disclosed for printing image files, including a printer, with a receptacle for receiving a memory card that stores a plurality of
15 image files. The printer further includes a user interface for enabling a user to enter selection commands, a display for showing messages, and a processor responsive to a first user input to print a sheet with reduced versions of the images in a first
20 sequence of the images. The processor is further responsive to another user input to specify at least one arrangement of the images files where they are all printed with the same orientation on a sheet.

BRIEF DESCRIPTION OF THE DRAWINGS

25 Figure 1 shows a printer suitable for practicing this invention.

Figure 2 shows a block diagram of the printer.

Figure 3 is a diagram of a front panel portion of the printer, the front panel providing a user interface.

Figure 4 shows a partial view of the printer and an apparatus for accepting memory cards.

Figure 5 is a flow chart of operations performed for printing image files.

Figure 6 is a flow chart of operations performed for saving image files.

Figures 7A, 7B, and 7C show examples of messages displayed on a display of the printer.

Figure 8 shows a schematic example of image files printed using a Photo Album page layout setting.

Figure 9 shows a schematic example of image files printed using a Paper Saver page layout setting.

DETAILED DESCRIPTION OF THE INVENTION

A printer 10 in which this invention is practiced is shown in Figure 1. Printer 10 includes top cover 15, output tray 20, trays 25, 30 for media to be printed upon, paper guides 35, 40, display 45, memory card slots 50, 55, and power button 60.

Figure 2 shows a block diagram of printer 10. Printer 10 includes processor 60 for directing printer operations, front panel 65 for receiving user inputs and for displaying messages to a user, receptacle 70 for receiving a memory device, such as a memory card 75 from a digital camera (not shown), and a printing

engine 80. Printer 10 also includes read only memory (ROM) 82 for storing programs, including a printer operating system 84 and a page layout program 86 in accordance with the invention. Printer 10 further
5 includes random access memory (RAM) 88 for storing temporary system operating parameters and temporary data for the page layout system.

Printer 10 is optionally connected to an external computing device 90 through link 100. The external
10 computing device 90 may be a personal computer or any device capable of communicating with printer 10, and typically includes display 93, processor 95, and storage 97.

The processor 60 executes the programs in ROM 82
15 either automatically, in response to user inputs from front panel 65, or in response to inputs from external computing device 90, if it is connected.

Processor 60 preferably includes a facility 62 for receiving and storing additional programs contained on
20 computer storage media, also referred to herein as memory media 64, such as a floppy disk drive, a compact disk drive, or a memory cartridge bay. Such programs may include, for example, the printer operating system 84, the page layout program 86, programs for
25 controlling print engine 60, programs for operating on, or in response to, various file types, including direct print order format (DPOF) files, jpeg files, or gif files, upgrades for programs already residing in read only memory (ROM) 82, and in general, programs related
30 to printing operations and for printing images.

Front panel 65 is shown in greater detail in Figure 3. Front panel 65 includes display 45 for preferably providing messages, prompts, information as to the content of memory card 75, information regarding the operation of printer 10, and other information to the user. Display 45 is preferably a 2-line, 16 characters per line, liquid crystal display. Front panel 65 further includes power button 60 for turning the printer on and off, button 170 for selecting a number of copies to be printed, button 180 for selecting a printed size of an image file, button 190 for selecting image files to be printed, and button 200 to cause the printer to print the selected image files. Front panel 65 further provides button 210 to stop printing, cancel a selection presented on display 45, or to answer no to a question presented on display 45. Button 220 is also provided to make a selection presented on display 45, or to answer yes to a question presented on display 45. Button 240 is provided for saving selected image files to external computing device 90, if it is connected, and button 250 is for changing the printer settings. The printer settings that may be changed by operating button 250 include the page layout settings, which will be explained in greater detail below.

Figures 4A and 4B show a partial view of printer 10. Memory cards 75A and 75B are of the type used in digital cameras for storing image files. Receptacle 70 preferably includes at least one connector 72 for receiving the memory card 75A, which may be one known as a CompactFlash™ memory card, and at least one

connector 74 for receiving a memory card 75B, which may be one known as a SmartMedia™ memory card.

Turning now to the flowchart of Figure 5, in accordance with the invention, in step A a user begins
 5 by taking photographs or recording images with a digital camera that stores images on memory card 75. Images are stored in memory card 75 in a digital file format, for example, a jpeg type file. Memory card 75 further includes a date, and orientation information
 10 about each image.

The user then removes memory card 75 from the digital camera and inserts it into receptacle 70 of printer 10 as in step B. When printer 10 is idle, display 45 preferably shows three fields: quantity of
 15 images chosen (top line), number of copies (bottom left), and image size (bottom right). Upon insertion of memory card 75 into receptacle 70, the printer operating system invokes page layout program 86, and display 45 preferably shows the word "Reading ...", as
 20 shown in Figure 7A. Upon completion of the read step, display 45 shows the number of image files found on the memory card 75 as shown in Figure 7B. Then display 45 displays "ALL PHOTOS, 1 copy, Index" as shown in Figure 7C.

25 In step C, the user then operates the buttons on front panel 65 to cause page layout program 86 to print an index page. An index page comprises a thumbnail of each image file, and a date, filename, and number for each image file on memory card 75. The index page is
 30 useful for reviewing the image files on memory card 75 as in step D, and for selecting individual image files to be printed. Of course plural index pages may be printed, depending on the number of image files and thumbnail size.

The user then operates the front panel buttons to select which image files to print (step E). This preferably done by operating button 190 to cause display 45 to display the number corresponding to the desired image as shown in Figure 7D. When the number of the desired image is displayed, a user operates button 220 to select the image. This process is repeated until all of the desired images have been selected. A user may also select a range of images to be printed. To select a range, the user operates button 190 until the number of the first image of the range is displayed. The user operates button 220 until a dash appears in display 45. The user then operates button 190 to select the last image of the range, and then operates button 220 to select the last image in the range of images to be selected. For all selections of images, the order in which the user selects the image files is the order in which they will be printed.

In step F, the user further operates the front panel to select an image size. The user can choose from a set of standard photo sizes, which for the U.S. are, 2½ X 3¼, 3x4, 3½ X 5, 4x6, 5x7, and 8x10 inches. When the aspect ratio of the image does not match the aspect ratio of a chosen image size, the image is cropped. The selected image files will all be printed using the selected size.

In step G, the user continues to operate the front panel buttons to specify a number of copies of the image files to be printed, and, in step H, a page layout setting. The user specifies the page layout setting by operating button 250 until a prompt appears on display 45 asking if the user desires to change the page layout. In response, the user operates button 220 to signify an affirmative answer. The user then

operates button 250 to select a choice of page layouts. The choices for page layout include (1) Photo Album, and (2) Paper Saver.

The Photo Album layout setting causes page layout
5 program 86 to arrange the image files such that all
images on a page are positioned right side up, are the
particular size selected, and are in their original
orientation, that is, either landscape or portrait.
The page orientation may change from page to page, in
10 that, some pages are viewable in the portrait
orientation, while other pages are viewable in the
landscape orientation. The viewing orientation of each
page is selected to allow the maximum number of images
to be printed on the page while satisfying the criteria
15 above, that is, all images on the page will appear
right side up, are a user specified size, and are in
their original orientation.

The orientation information about a particular
image is normally provided by the source of the image
20 file, for example, the digital camera. When
orientation information is not provided by the image
source, page layout program 86 uses a landscape
orientation for the image files and makes decisions
about the arrangement of the image files accordingly.

25 The Paper Saver layout setting causes page layout
program 86 to arrange as many images on a page as
possible, for the chosen image size. Any image
orientation information from the image source is
ignored, and all images are arranged in a landscape
30 orientation. The maximum number of images per page is
determined by the selected image size. The number of

images per page varies, depending on the quantity of images entered and the image size chosen.

The user may optionally adjust the brightness of the images thus causing the images to print lighter or darker than specified by the image file. To adjust the brightness, the user operates button 250 until a prompt appears on display 45 asking if the user desires to adjust the brightness of the images. In response, the user operates button 220 to signify an affirmative answer. The user then operates button 250 to select a desired brightness, operating the button in one manner to lighten the images and in another manner to darken the images. In the preferred embodiment, pushing the right side of button 250 will lighten the images and pressing the left side of button 250 will darken the images.

Upon completing the selections, the user operates print button 200 as shown in step I. In response, page layout program 86 begins in step J, by identifying the image size chosen by the user. Page layout program 86 then identifies the quantity of images chosen (step K), the number of copies (step L), the order specified (step M), and the orientation (step N) of the selected images. Page layout program 86 then interrogates the page layout setting (step O) specified by the user in step H.

For a page layout setting of Photo Album, page layout program 86 then interrogates each image file on memory card 75 to identify the orientation of each of the image files selected. Page layout program 86 then groups the images in the order selected by the user.

Using the size specified by the user, and the orientation of the image files, page layout program 86 then segregates the ordered image files into pages, selecting a page orientation for each page so that the maximum number of image files is printed on each page while maintaining each image's size and orientation. After this step of segregating by page, page layout program 86 then retrieves each image file from memory card 75 in the order specified by the user, rotates the file if required to print the file "right side up" and proceeds to cause the printer to print each image "right side up," in its original orientation, in the order specified by the user as shown in step P.

Figure 8 shows a schematic example of image files printed using the Photo Album page layout setting. The images are displayed in the order that the user specified, that is 300, 301, and then 302. The images are also "right side up" in their correct orientation, that is images 300 and 301 are in portrait orientation, and image 302 has a landscape orientation.

Returning to Figure 5, for a page layout setting of Paper Saver, page layout program 86 identifies the size specified by the user in step J, and the image files specified by the user in step E. As shown in step Q, page layout program 86 then arranges the images in a landscape orientation on the page, in a way so that the maximum number of image files are printed on the page regardless of the order of the images specified, and causes the printer to print the page.

Figure 9 shows a schematic example of image files printed using the Paper Saver page layout setting. The order of the images specified by the user was 310, 311, 312, and 313. Further the user has specified images to be printed having a landscape orientation 312, 313 and having a portrait orientation 310, 311. Consistent with the Paper Saver setting, the page layout program 86 has arranged the images in a landscape orientation on the page, regardless of their original orientation, in a way so that the maximum number of image files are printed on the page regardless of the order of the images specified.

Image files to be printed may originate from sources other than memory card 75. Returning to Figure 2, front panel 65 further includes infra-red interface 260. A suitably equipped digital camera may transmit image data to printer 10 through infra-red interface 260. Turning to Figure 4, in step R, the user may take photographs, or record images with a suitably equipped digital camera and then, as in step S, transmit those images to printer 10 through infrared interface 260. The user then proceeds with step C through the various steps explained above to print the desired image files.

The user may optionally store the images on external computing device 90 in storage 97. As shown in Figure 6, in step A, the user takes photographs, or records images using a digital camera, and may insert memory card 75 from the digital camera into receptacle 70 (step B), or may transmit the images through infrared interface 260 (step C). The user may then operate button 240 on front panel 65 (Figure 3) to save the

image files to external computing device 90 as in step D. Optionally, the user may operate front panel 65 to print an index page (step E). The user may then review the index page (step F), and further operate front panel 5 65 to choose image files to be saved (step G). The user may then save the image files by operating button 240 (step D), as stated above. After operating button 240 to save the image files on external computing device 90, the user may optionally change or specify the file 10 location within storage 97 on external computing device 90 as shown in step E.

Returning to Figure 5, once stored on external computing device 90, the file containing the image files may be opened (step T) and may be sent to printer 10 15 (step U). The user then proceeds with step C through the various steps explained above to print the desired image files.

Thus, while the invention has been particularly shown and described with respect to preferred 20 embodiments thereof, it will be understood by those skilled in the art that changes in form and details may be made therein without departing from its scope and spirit.